

Semantic Web Workshop

Karl D'Adamo

Since I got my first UNIX account on the undergraduate-operated computer cluster at Caltech, I have been exposed to computer science, the web and the limitless possibilities of the future of computers and information. Exposure to the historical adoption of standards in computer science and the web whetted my interest, but I remained a user of the technology instead of a creator of new technologies. Many interests and projects in my life relate to the Semantic Web. It is difficult to pare this down to two pages, but I will try.

I have been working at Applied Materials since I graduated from college (2 years). I was educated as a chemical engineer at Caltech, and my education included little practical engineering, and a lot of mathematics and computer science. I realized very quickly that I could never be happy being a chemical engineer when what had excited me in school was not the results of the solutions to the differential equations of fluid, mass and heat transfer, but the solutions themselves. Instead of feeling cheated at not receiving the engineer they thought they were getting, my employer was happy to accommodate my interests. Applied Materials makes semiconductor processing equipment, but the division that I work in is responsible for offering service to our customers and empowering the 10,000 technicians that fix our often broken tools with the information that they need to do their jobs. I am also very lucky to be in a position where I get to make recommendations and decisions about what kinds of IT solutions we should use to maximize the productivity of our employees.

We, as a company, have come to the realization that the delivery of information to our technicians in the field is vital to improving their productivity. Our industry presents perhaps a worst case scenario because our technicians need access to gigabytes of information (installation and repair manuals, up-to-date best known methods), our customers span hundreds of countries, requiring documentation and information be available in dozens of languages, and most of the people in the field require wireless access to our networks since they work in customer fabs which do not allow their computers to connect to the Applied Materials network. As a first step to solve this problem, we are attempting a redesign of how our documents are written and distributed. Authoring will require extensive use of meta-tagging, and retrieval will require a more intelligent system of searching and delivery. The next step would be intelligent logic that pushes the information to the end users based on their roles, responsibilities and interests. The first step has begun; the second step is being planned. To implement and design the solutions, we require an understanding of the basic ideas and technology available.

A second major area I am involved with is the optimization and automation of our customers' fabs. If there is one thing that I have come to realize recently, it is that operating a \$2B fab and ensuring costs are kept down while yield is maximized is a dauntingly complex task. All aspects of operations, from material monitoring to resource planning to failure escalation require tremendous steps forward in terms of the data that is collected as well as in terms of how that data is organized and analyzed. We are in a position to define standards in terms of data collection and analysis, but at Applied Materials, as elsewhere, we are still unsure of how to proceed.

In addition to the challenges that I face at work, there are other areas of my life that relate to the Semantic Web. Since I first learned of predicate logic and its power, I have been interested in its limitations as well. Understanding Godel's Incompleteness theorem brought a new clarity to logic as well as a new set of questions to my mind. I have struggled constantly with attempts to formalize my thought. Although my lack of success can probably be attributed to my own mind, I think that RDF is an immensely interesting framework to do further analysis of predicate logic, its power and its limitations. I would love to be one of the people who finds out what happens when we use RDF and the Semantic Web define the how the predicate of "predication" can be applied to resources.

In addition to these high-minded applications of the Semantic Web, I have become somewhat of an information junkie in my 7 or so years of using the web. The practical knowledge and intuition that I have built up has been invaluable in sorting through the junk that is out there in order to get at the information that I want. Once the underlying logic has been established, I can only imagine the possibilities that become reality.

I am also keenly aware and interested in the law and how it applies to the internet. I realize that while all information should be available to everyone, it is important to have patent-type protection on the organization of information. It should be legal to copy a white page and resell it. But I think there need to be laws protecting the novel and unique organization of information. The Semantic Web offers to create a much more powerful framework for the organization

and manipulation of information, and I think it will force people to rethink these laws.

I don't want to sort through 100 webpages to find what I want anymore. I am tired of writing python scripts to search webpages to find and extract structured information. Most of all, I am in awe of the possibilities that the Semantic Web will provide, and I want to learn more, and help the effort.